

User's Manual

CT1000, CT200, CT60 AC/DC Current Sensor

Thank you for purchasing the AC/DC Current Sensor (Model CT1000, CT200, CT60). To ensure correct use, please read this manual thoroughly before beginning operation. After reading this manual, keep it in a safe place.

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IM CT1000-01EN
2nd Edition

Safety Precautions

Make sure to observe the following safety precautions when handling the current sensor. YOKOGAWA assumes no liability for the customer's failure to comply with these safety precautions. Before you use the current sensor, read the measuring instrument's manual to fully acquaint yourself with its specifications and handling.

The following symbols are used on this instrument.

- Warning: handle with care. Refer to the user's manual or service manual. This symbol appears on dangerous locations on the instrument which require special instructions for proper handling or use. The same symbol appears in the corresponding place in the manual to identify those instructions.
- Risk of electric shock
- Hot surface

Make sure to observe the following safety precautions to prevent electric shock, personal injury, or damage to the instrument.



WARNING

- **Beware of electric shock.**
 - Do not perform measurement if the case is damaged.
 - Do not operate the device with wet hands, in a rainy or humid environment, or if any water droplets are visible on it.
 - Condensation may appear if sudden changes in temperature occur. If this happens, let the device acclimate to the new temperatures for at least one hour, then refrain from using the device until confirming that there is no condensation.
- **Do not disassemble the device.**
The device should be disassembled by qualified personnel only.
- **Use the correct power supply.**
Ensure that the source voltage matches the voltage of the power supply before turning the power ON.
- **Do not use uninsulated measurement conductors or cables.**
Use conductors or cables with reinforced insulation.
- **Make sure that the surface temperature of measurement conductors is within the device's operating temperature range.**
- **Although it is well-insulated, do not touch the device or secondary output cable while voltage is being applied to the primary conductor.**
- **Connect the secondary signal output before supplying power to the device.**
- **Do not disconnect the secondary output while power is being supplied to the device to prevent electric shock or damage to the instrument.**
- **Do not apply primary current before supplying power to the device to prevent electric shock or damage to the instrument.**
- **Do not input excessive current as malfunction or damage may result.**
- **Do not allow vibrations to disturb the device after it has been set in place as damage may result.**

The following symbols are used in this manual.



Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user's manual for special instructions. The same symbol appears in the corresponding place in the user's manual to identify those instructions. In the manual, the symbol is used in conjunction with the word "WARNING" or "CAUTION."

WARNING

Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

CAUTION

Calls attention to actions or conditions that could cause light injury to the user or damage to the instrument or the user's data, and precautions that can be taken to prevent such occurrences.

Note

Calls attention to information that is important for proper operation of the instrument.

Directive 2002/96/EC



(This directive is only valid in the EU.)

This product complies with the WEEE Directive (2002/96/EC) marking requirement. This marking indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category

With reference to the equipment types in the WEEE directive Annex 1, this product is classified as a "Monitoring and Control instrumentation" product.

Do not dispose in domestic household waste. When disposing products in the EU, contact your local Yokogawa Europe B. V. office.

Compliance with the Radio Waves Act (Republic of Korea)

This product complies with the Radio Waves Act (Republic of Korea).

Note the following when using the product in Republic of Korea.

이 기기는 가정용 (B 급) 전자파 적합 기기입니다

The product is for home use (Class B) and meets the electromagnetic compatibility requirements.

Registration No: KCC-REM-IMY-EEN314

Equipment Name: Current Sensor

Trade Name: Yokogawa Meters & Instruments Corporation

Manufacturer: Yokogawa Meters & Instruments Corporation

Country of Origin: Denmark

1. Description

This device is a current output type current sensor with a 1500:1(for CT1000) 1000:1(for CT200) or 600:1(for CT60) current transformation ratio that performs transformation on the primary current. After familiarizing yourself with the performance and functions of this device, you will be able to use it in conjunction with measuring instruments from YOKOGAWA.

2. Configuration

The current sensor consists of the following parts.

Standard parts

1. Current sensor
2. User's manual

Accessories sold separately

- | | |
|------------------|---------|
| Output connector | B8200JQ |
| Load resistors | B8200JR |

3. Part Names

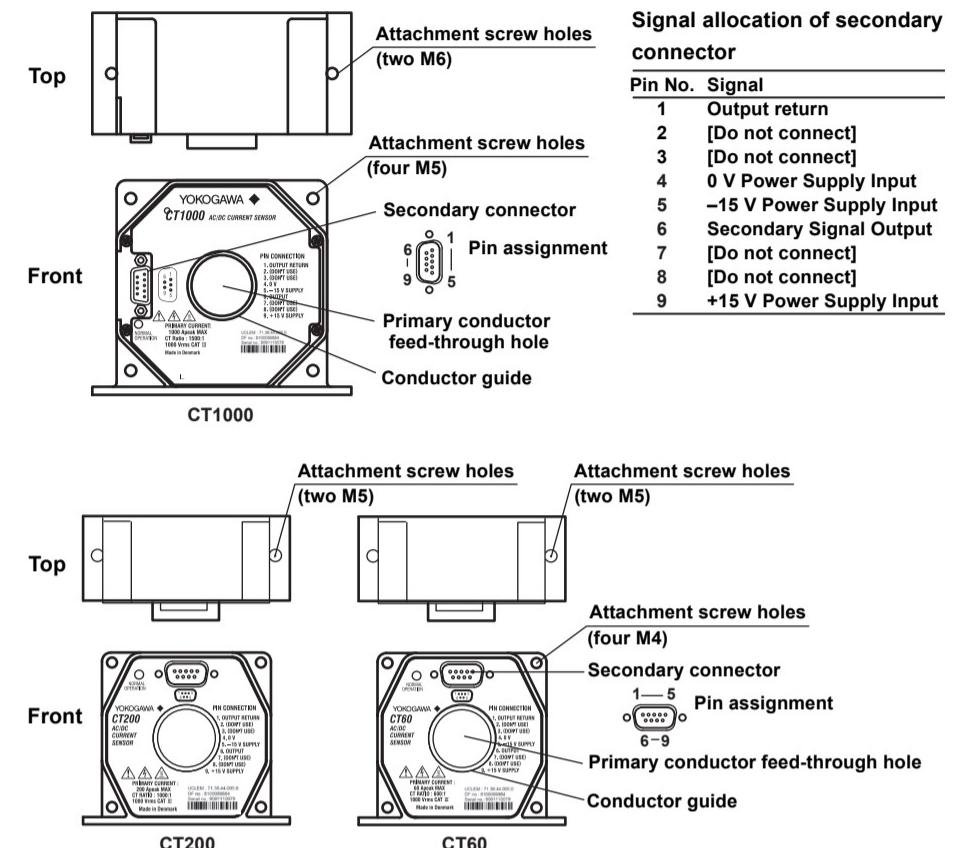


Figure 1. Names of Parts and Pin Assignments

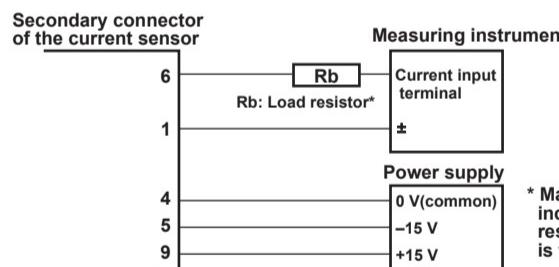
4. Operating Procedure



CAUTION

Ensure that the current flowing to the conductor of the object to be measured is within the measuring range. If the current exceeds the measuring range, the device may overheat and get damaged.

1. Connect the secondary connector on the device to the current input terminal on the measuring instrument, and connect to 0 V (common) and ±15 V on the power supply.
2. Set up the measuring instrument and power supply to match the specifications of the current transducer. Carefully read the user's manuals for your measuring instrument and power supply to perform the correct procedure for making the connections.

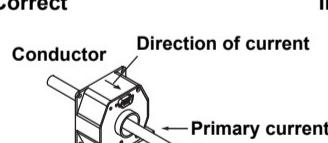


* Make sure that the total load resistance including measuring instrument's internal resistance and external load resistance (Rb) is within the specification.

Figure 2. Connection Example

3. Insert the primary conductor into the primary conductor feed-through hole on the device. Make sure that the direction of current flow matches the arrow on the device. Figure 3 is for the examples in use with CT200 and CT60. The same idea is applied to CT1000 as well.

Correct



Incorrect



Using two parallel conductors



Figure 3. Insertion of a Conductor

4. Check that power is being supplied to the device, and then apply the primary current.
5. Read the measured values. The following calculation is used to determine the current flowing through the primary conductor.

Example: When the output current from the device's secondary connector (pin 6) is 100 mA.

CT1000: 100 mA × 1500 = 150 A.

CT200: 100 mA × 1000 = 100 A.

CT60: 100 mA × 600 = 60 A.

Note

- If the NORMAL OPERATION LED is off even when power is being supplied to the device, the protection function may be activated. Immediately stop the primary current.
- Only pass conductors through the primary conductor feed-through hole if the current that you want to measure is flowing through the conductors and their current directions are the same. Correct measurements cannot be taken if you pass conductors with magnetic shielding or conductors whose current directions are opposite of each other through the feed-through hole.
- Make sure the primary wiring and secondary wiring do not interfere with each other. The secondary wiring may be affected by the primary wiring because it uses a very small current. Make the secondary wiring as short as possible and maintain its distance from the primary wiring, without allowing them to be parallel to each other. We recommend AWG24 or higher for the secondary wiring material. Twisted-pair may be better than shielded cable for measurement applications such as inverters.

- The device outputs current. Connect the device to a measuring instrument with current input.
- To connect the device to a measuring instrument with voltage input, use an appropriate shunt resistor to connect the device to the voltage input terminals.
- Configure your setup so that the load resistance of the measuring instrument connected to the secondary signal output is within the specification range.
- Correct measurements may not be possible in places where there is an extremely strong external magnetic field besides the magnetic fields produced by the primary current of the object to be measured or where there is a strong electric field.

5. Specifications

Item	Model		
	CT1000	CT200	CT60
Current Rating	DC: 0 to 1000 A AC: 1000 Apeak	DC: 0 to 200 A AC: 200 Apeak	DC: 0 to 60 A AC: 60 Apeak
Output Current	Primary rated current at 1000 A is 666.6 mA.	Primary rated current at 200 A is 200.0 mA.	Primary rated current at 60 A is 100.0 mA.
Current Transformation Ratio	1500:1	1000:1	600:1
Direction of Current	Per the arrow printed on the main unit.		
Accuracy	DC: $\pm(0.05\% \text{ of reading} + 30 \mu\text{A})$ 50/60 Hz: $\pm(0.05\% \text{ of reading} + 30 \mu\text{A})$ sine wave Standard Conditions $23 \pm 5^\circ\text{C}$ Common mode voltage: 0 V Conductor: $\varnothing 25 \text{ mm}$; length, 300 mm or more; straight		
Accuracy warranty period	12 months		
Effect of Position of Conductor	Add $\pm(0.01\% \text{ of reading})$		
Measurement Band (-3dB)	DC to 300 kHz	DC to 500 kHz	DC to 800 kHz
Temperature Coefficient	In the 10 to 18°C , 28 to 50°C ranges: $0.01\%/\text{C}$		
Max. Allowable Continuous Input	1000 Apeak	200 Apeak	60 Apeak
Derating of Max. Allowable Input	For the maximum allowable continuous current with respect to frequency, see figure 4.		
Instantaneous Max. Allowable Input (0.1 sec. or less, reference value)	4500 Apeak	1000 Apeak	300 Apeak
Maximum Rated Voltage	1000 Vrms CAT III		
Load Resistance	2.5 to 5 Ω	0 to 30 Ω	0 to 20 Ω
Operating environment	Temperature: 10 to 50°C Humidity: 20 to 80%RH (no condensation) Altitude: 2000 m or less		
Storage environment	Temperature: -20 to 60°C Humidity: 20 to 80% RH (No condensation) Altitude: 3000 m or less		
External Dimensions	Approx. 128(W) x 106(H) x 60(D) mm (excluding the connector and conductor guide)	Approx. 93(W) x 77(H) x 38(D) mm	
Diameter of Primary Current Hole	$\varnothing 30 \text{ mm}$	$\varnothing 26 \text{ mm}$	
Secondary Connector	D-Sub 9 pin		
Weight	Approx. 0.8 kg.	Approx. 0.3 kg.	
Power Supply Voltage	$\pm(15 \text{ V} \pm 5\%)$		
Maximum Rated Power Consumption	30 VA	11 VA	7 VA
Current Consumption (at Power Supply Voltage)	Approx. (150 mA + output current)	Approx. (80 mA + output current)	
Recommended fastening torque			
*Flat mounting	M5x4 steel screws 3.7 Nm	M4x4 steel screws 2.8 Nm	
*Straight mounting	M6x2 steel screws 4.4 Nm	M5x2 steel screws 3.7 Nm	
Safety standard	Compliant standards EN61010-1		
Emissions	Compliant standards EN61326-1 ClassB, EN55011 ClassB, Group1 C-tick EN55011 ClassB, Group1		
Immunity	Compliant standards EN61326-1 Table 2 (for industrial locations)		
Accessories	User's manual: 1 pc.		
Opt. Accessories (Sold Separately)	• D-Sub 9 pin connector (plug, part number B8200JQ): 1 pc. • Load resistor (four 10- Ω resistors, part number B8200JR, accuracy of resistance value $\pm 0.1\%$, temp. coefficient 25 ppm/ $^\circ\text{C}$): 1 group. Example: To apply a 2.5 Ω load resistance, connect the four 10 Ω resistors in parallel.		

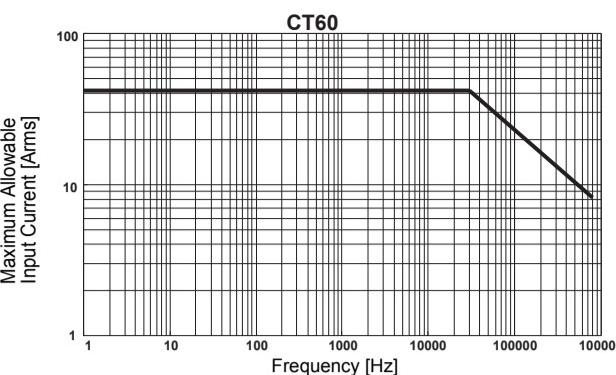
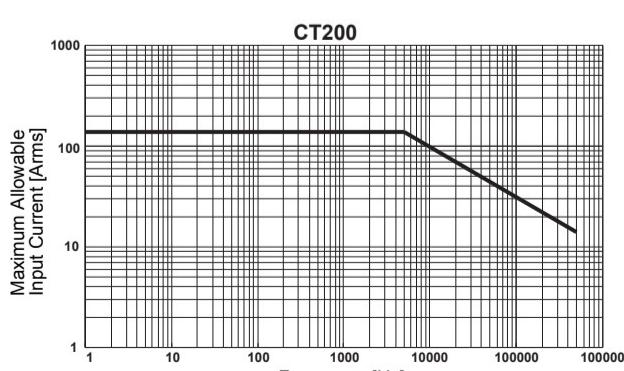
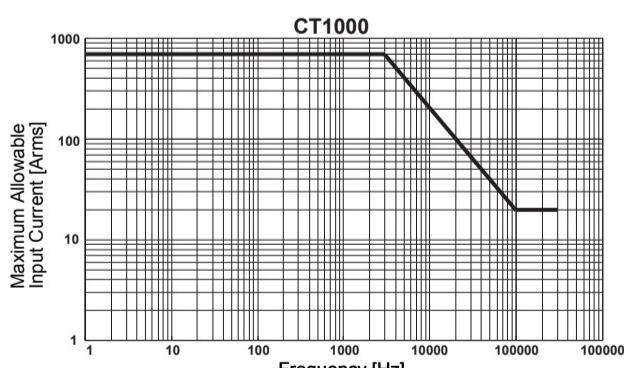
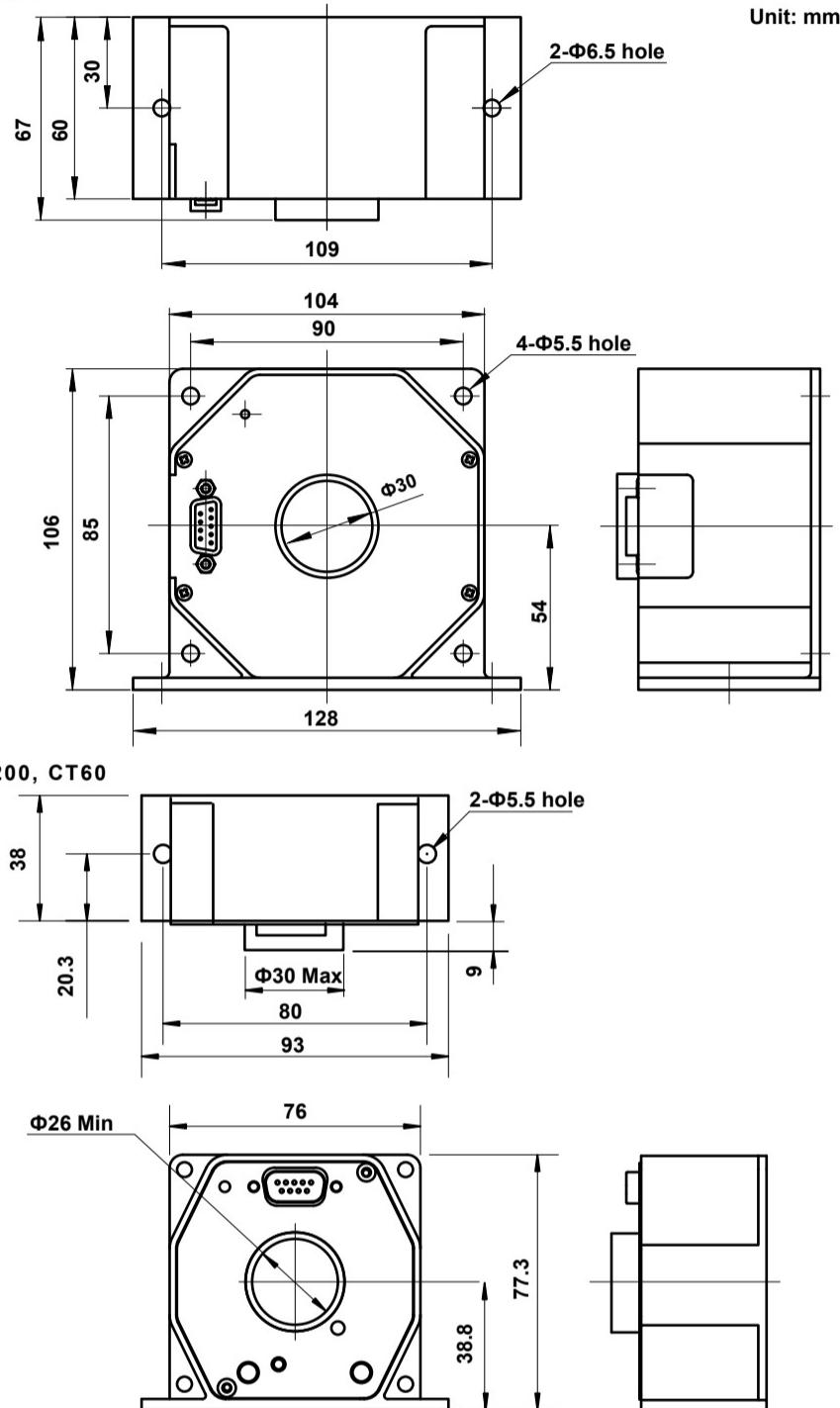


Figure 4. Derating of Primary Current by Frequency

CT1000



Unless otherwise specified, tolerances are $\pm 3\%$ (however, tolerances are $\pm 0.3 \text{ mm}$ when below 10 mm).

Figure 5. External Dimensions

6. Servicing

If you encounter any problems during use, or if the device does not appear to be operating normally, contact your nearest YOKOGAWA dealer.

7. Warranty

If you experience a breakdown in the device due to faulty manufacturing or accidents during shipping, contact your nearest YOKOGAWA dealer.

8. 产品中有毒有害物质或元素的名称及含量

This section is valid in China only.

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
框架 (塑料)	<input type="radio"/>					
框架 (金属)	<input type="radio"/>					
线路板 ASSY	<input type="radio"/>					

表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。

表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。

9. 环保使用期限

This section is valid in China only.

表示该有毒有害物质在该产品中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。

